December 1934

REPORT ON STATUS OF THE EUROPEAN CORN BORER IN 1934

Division of Cereal and Forage Insects
Bureau of Entomology and Plant Quarantine
U. S. Department of Agriculture

European Corn Borer Research

REPORT ON STATUS OF THE EUROPEAN CORN BORER IN 1934.

A. M. Vance, Assistant Entomologist, Division of Cereal and Forage Insects, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture.

Introduction

A survey to determine the status of the European corn borer over a considerable portion of the territory known to be infested by this insect was conducted during the period August 15 to October 5, 1934, from the laboratory for European corn borer research at Toledo, Ohio, W. A. Baker, in charge. Fifteen men were engaged in this activity and a total of 1580 cornfields, located in an area comprised of 125 counties in the States of Michigan, Indiana, Ohio, Pennsylvania, New York, Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island, and New Jersey, were examined for infestation.

Active cooperation in the work was given to the Federal Bureau by the Conservation Department of Indiana in the survey of a number of counties in that state.

Procedure

To provide adequate comparisons between counties and between county groups for this and preceding years, as well as to obtain a general picture of the infestation over the entire area surveyed, field methods which have previously proved to be satisfactory for such purposes were employed again in 1934.

As a rule, the counties situated in the older and usually heavily-infested portion of the area were considered separately and in each a total of 20 random fields were surveyed. In the more lightly infested regions, the counties were combined in groups of three to five and in each group a total of 40 random fields were surveyed.

The percent of plant infestation was determined by a count of 100 plants in each field and the average number of borers per infested plant found by a dissection of 10 infested plants in each field of a county unit and of 5 infested plants in each field of a county group.

Discussion

Various data explanatory of the status of the European corn borer in 1934 are presented in the accompanying tables, maps, and chart, and a brief summary of the information is given in the following paragraphs.

Over the one-generation area as a whole, there was a general decrease in borer infestation in 1934 from that found in either of the past two years.

In a comparison of borer populations in 32 counties or county groups which are representative of the older and heavier infested portion of this area and which were surveyed in both years, definite increases in 1934 over 1933 were evident in only the following three counties or county groups: Seneca in Ohio, and Monroe and Wayne in New York. In the other 29 counties or county groups, the data from which are comparable for these two years, the infestation in 1934 had either shown no appreciable change from that of the previous year or had decreased.

Among 14 other counties or county groups, which are representative of the lighter infested part of the one-generation area and which were surveyed in 1932 and not again until 1934, only two county groups, Noble-Whitley-Huntington in Indiana and Medina-Summit-Portage-Stark-Wayne in Ohio, showed increases in 1934 as compared with 1932.

The level of borer population in the one-generation area in 1934 was relatively low, not exceeding an average of 48 borers per 100 plants in any county of Michigan, Ohio, or Indiana, and not surpassing an average of 91 borers per 100 plants in any county of New York (exclusive of Long Island).

The average numbers of borers per 100 plants for the portions of the different states in the one-generation area surveyed in 1934 were determined as follows: Michigan - 11.6; Ohio - 11.8; Indiana - 2.7; Pennsylvania - 2.2; Vermont - 23.2; and New York - 30.3.

The heaviest infestation in the one-generation area in 1934 occurred in the New York counties bordering Lake Ontario and in a limited region of Michigan and Ohio extending a short distance southwestward from the western end of Lake Erie. In Indiana, the chief concentration of borer population continued to be in Steuben, DeKalb and Allen counties, in the extreme northeastern corner of the state. The infestation in southern Vermont was higher in the western than in the eastern half of the four counties surveyed.

In the two-generation area the heaviest infestation in general continued to appear in southeastern New England (particularly in eastern Massachusetts, Rhode Island, and southern Connecticut) and on the eastern half of Long Island, New York. In these regions practically all of the surveyed fields were infested and 50 percent of them had populations of more than 100 borers per 100 plants.

The maximum infestation in this area in 1934 was recorded for New Haven and Middlesex counties in Connecticut where the average numbers of borers per 100 plants were 325 and 318, respectively.

Among 9 comparable counties or county groups in the two-generation area, New Haven, Middlesex, and New London counties in southern Connecticut showed definite increases in their borer populations in 1934 over the figures obtained for the same counties in either of the past two years. The other 6 counties either maintained about the same infestation in 1934 as in 1933 or showed a significant decrease.

Two of five other county groups in the two-generation area surveyed in 1934 had a higher infestation this year than in 1932 when they were last surveyed. The increases occurred in the group unit of Worcester-Franklin-Hampshire-Hampden counties in Massachusetts and in that of Monmouth-Ocean-Burlington-Atlantic counties in New Jersey.

The increase in the New Jersey infestation from an average of 0.3 borers per 100 plants in 1932 to 7.7 in 1934, represents a considerable building up of the borer population in that state during the two-year period. Eighteen of the 40 fields (45 percent) surveyed there in 1934 were infested as compared to only 4 of 120 fields (3.3 percent) surveyed in that region in 1932. The concentration of the borer in New Jersey was found in Monmouth county and in the eastern portion of Ocean county.

As shown on the accompanying chart, the general level of borer infestation in 1934 tended to be considerably higher in the two- than in the one-generation area. In the two-generation area 16.1 percent of the fields surveyed in 1934 were uninfested and 26.7 percent had populations of 1 to 25 borers per 100 plants; in the one-generation area, 28.8 percent of the fields surveyed this year were uninfested and 55.9 percent had populations of 1 to 25 borers per 100 plants. In the former area, 21.2 percent of the fields were infested with more than 200 borers per 100 plants while in the latter less than a half of 1 percent of the fields were infested to the same extent.

The general decrease of borer infestation in 1934 in the Central States and in western New York is attributed to subnormal moisture conditions, which were more or less persistent during the past winter and which reached extremes in May, June, and July of the present year, in combination with abnormally high temperatures in these three months. Such excessive heat and drouth over an extended period of time covering pupation of the borer in the spring, oviposition of the moths, and summer establishment of young larvae in corn proved extremely adverse to the propagation of the species in the one-generation area. Drouth conditions which did not favor borer increase also prevailed in certain parts of the two-generation area. In regions where more nearly normal temperature and moisture conditions prevailed the borer population in 1934 showed a trend of increase rather than one of decrease.

Table 1.

Data on Infestation of the European Corn Borer in the Fall of 1934 and Comparisons with Figures for 1932 and 1933.

One-Generation Area

Michigan

County or County Group	Average number of borers per 100 plants 1932	1933	1934
Lenawee	50.0	32.0	13.3
Macomb	72.6	16.4	20.9
Monroe	72.7	62.8	27.6
Saint Clair	20.8	15.7	11.8
Washtenaw	49.7	16.4	2.7
Wayne	59.7	35.8	7.7
Lapeer-Livingston-Oakland	24.8	14.0	3.7
Genesee-Huron-Sanilac-Tuscola	40.2	--	15.6
Hillsdale-Ingham-Jackson	13.3	--	1.2
Regional average (Based on first 7 counties and county groups which are comparable)	50.0	27.6	12.5

Ohio

Defiance	12.8	12.6	8.1
Fulton	46.2	53.7	30.1
Hancock	53.8	36.5	25.9
Henry	52.7	58.8	10.4
Lucas	49.8	181.2	22.7
Ottawa	49.7	70.7	22.5
Paulding	30.5	6.5	3.0
Putnam	48.0	15.0	3.1
Sandusky	66.3	71.7	3.8
Seneca	46.6	6.5	16.7
Williams	27.1	34.1	2.5
Wood	66.5	92.5	47.6
Allen-Auglaize-Mercer-Van Wert	19.5	7.1	8.4
Crawford-Wyandot	13.2	14.0	1.5
Erie-Huron-Lorain	20.0	13.6	10.2
Ashland-Knox-Morrow-Richland	4.1	--	2.1
Delaware-Hardin-Marion-Union	17.4	--	7.1
Champaign-Darke-Logan-Miami-Shelby	7.0	--	5.0
Clark-Fayette-Greene-Madison-Montgomery	0.8	--	0.3
Medina-Portage-Stark-Summit-Wayne	2.8	--	5.7
Regional average (Based on first 15 counties and county groups which are comparable)	40.2	45.0	14.4

Indiana

County or County Group	Average number of borers per 100 plants 1932	1933	1934
Allen-DeKalb-Steuben	6.6	11.8	7.7
Adams-Blackford-Jay-Wells	0.6	--	0.3
Delaware-Henry Randolph-Wayne	0.2	--	0
Huntington-Noble-Whitley	1.3	--	2.6
Regional average (First county group only)	6.6	11.8	7.7

New York

Chautauqua	31.5	29.7	8.6
Erie	36.9	19.9	7.7
Genesee	28.7	34.8	14.3
Jefferson	157.7	41.3	50.8
Monroe	66.8	23.4	60.1
Niagara	51.9	19.2	25.3
Orleans	65.8	55.6	90.5
Oswego	159.4	31.3	32.0
Wayne	74.4	23.6	44.9
Cattaraugus	19.5	--	0.8
Livingston-Ontario-Wyoming	35.1	--	2.7
Albany-Fulton-Montgomery-Schenectady-Schoharie	71.4	--	25.4
Regional average (Based on first 9 counties which are comparable)	74.8	31.0	37.1

Pennsylvania

Erie-Crawford-Warren	--	--	2.2

Vermont

Bennington-Rutland Windham-Windsor	15.8	--	23.2

Two-Generation Area

Massachusetts

County or County Group	Average number of borers per 100 plants 1932	1933	1934
Bristol	206.8	469.4	107.2
Essex	211.8	104.2	105.8
Middlesex	153.0	214.2	185.9
Norfold-Plymouth-Barnstable	181.6	--	153.5
Worcester-Franklin-) Hampshire-Hampden)	13.0	--	40.1
Regional average (Based on first 3 counties which are comparable)	190.5	262.6	133.0
Rhode Island			
Newport-Bristol	190.0	326.3	172.3
Providence-Kent-Washington	43.8	--	61.7
Regional average (Based on first county group only)	190.0	326.3	172.3
Connecticut			
Hartford	50.7	387.4	61.3
Middlesex	31.5	153.6	318.2
New Haven	2.4	107.9	325.0
New London	76.7	49.7	135.8
Regional average	40.3	174.7	210.1
New Hampshire			
Hillsborough-Rockingham-Strafford	19.9	--	7.6
New York (Eastern Long Island)			
Suffolk	394.4	356.5	279.6
New Jersey			
Monmouth-Ocean-Burlington-Atlantic	0.3	--	7.7

Summary of 1934 Infestation by States and Areas.

	Average number of borers per 100 plants		
	1932	1933	1934
One-Generation Area			
Michigan	50.0	27.6	12.5
Indiana	6.6	11.8	7.7
Ohio	40.2	45.0	14.4
New York	74.8	31.0	37.1
Pennsylvania	--	--	2.2
Vermont	15.8	--	23.2
Area average	42.9	28.9	17.9
Two-Generation Area			
Massachusetts	190.5	262.6	133.0
Rhode Island	190.0	326.3	172.3
Connecticut	40.3	174.7	210.1
New Hampshire	19.9	--	7.6
New York (Eastern Long Island)	394.4	356.5	279.6
New Jersey	0.3	--	7.7
Area average	203.8	280.0	198.8

NOTE: Averages based only on comparable counties or county groups.

Table 2

A Ten-Year Comparison of Borer Populations in the Older Infested Portions of the One-Generation Area 1925-1934. (Based on Comparable Counties)

State and County	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	Ten-year average
Ohio											
1 Lucas	27.5	174.0	131.4	159.4	147.0	28.8	53.8	49.8	181.2	22.7	97.6
2 Ottawa	10.6	51.2	37.2	47.9	41.2	42.5	55.8	49.7	70.7	22.5	42.9
3 Sandusky	0.2	0.8	5.8	16.6	11.9	12.4	78.0	66.3	71.7	3.8	26.8
4 Seneca	0.3	0.3	1.6	5.5	29.1	5.1	69.4	46.6	6.5	16.7	18.1
5 Wood	1.0	0.8	3.0	11.4	56.7	7.4	71.6	66.5	92.5	47.6	35.9
6 Fulton	0	1.6	3.5	13.6	35.5	14.7	29.8	46.2	53.7	30.1	22.9
7 Henry	0	0.1	0.8	2.3	6.9	24.6	36.3	52.7	58.8	10.4	19.3
8 Putnam	0	0	0.1	0.8	6.6	5.9	51.4	48.0	15.0	3.1	13.1
9 Williams	0	0.1	0.2	1.8	2.5	7.5	8.9	27.1	34.1	2.5	8.5
10 Paulding	0	0	0	0.1	1.6	2.0	10.4	30.5	6.5	3.0	5.4
Averages	4.0	22.9	18.4	25.9	33.9	15.1	46.5	48.3	59.1	16.2	29.0
Michigan											
1 Lenawee	0	0.3	2.8	34.2	32.9	31.9	32.9	50.0	32.0	13.3	23.0
2 Monroe	1.7	25.1	64.4	67.4	80.6	14.0	42.7	72.7	62.8	27.6	45.9
3 Wayne	2.9	87.9	212.3	17.9	16.6	10.8	64.3	59.7	35.8	7.7	51.6
4 Macomb	3.2	17.0	37.3	38.7	20.9	39.1	21.5	72.6	16.4	20.9	28.8
5 St. Clair	0.9	7.6	51.8	45.3	13.9	23.8	22.7	20.8	15.7	11.8	21.4
6 Washtenaw	0.1	1.0	0.5	2.3	10.0	3.8	10.8	49.7	16.4	2.7	9.7
Averages	1.5	23.2	61.5	34.1	29.2	20.6	32.4	54.3	29.9	14.0	30.1
New York											
1 Chautauqua	1.1	3.6	5.4	11.9	8.5	17.8	59.2	31.5	29.7	8.6	17.7
2 Erie	2.2	45.7	31.4	74.8	13.0	18.1	26.0	36.9	19.9	7.7	27.6
3 Niagara	0.5	2.7	16.4	12.2	21.3	54.4	65.7	51.9	19.2	25.3	27.0
4 Orleans	0.1	2.1	8.3	86.8	18.8	89.0	61.9	65.8	55.6	90.5	47.9
5 Genesee	0.1	0.5	4.7	2.3	4.2	16.7	32.3	28.7	34.8	14.3	13.9
6 Monroe	0.1	0.1	11.7	13.1	3.0	20.6	116.9	66.8	23.4	60.1	31.6
Averages	0.7	9.1	13.0	33.5	11.5	36.1	60.3	46.9	30.8	34.4	27.6
Summary											
Ohio	4.0	22.9	18.4	25.9	33.9	15.1	46.5	48.3	57.1	16.2	29.0
Michigan	1.5	23.2	61.5	34.1	29.2	20.6	32.4	54.3	29.9	14.0	30.1
New York	0.7	9.1	13.0	33.5	11.5	36.1	60.3	46.9	30.8	34.4	27.6
Area average	2.1	18.4	31.0	31.2	24.9	23.9	46.4	49.8	39.3	21.5	28.9

Table 3

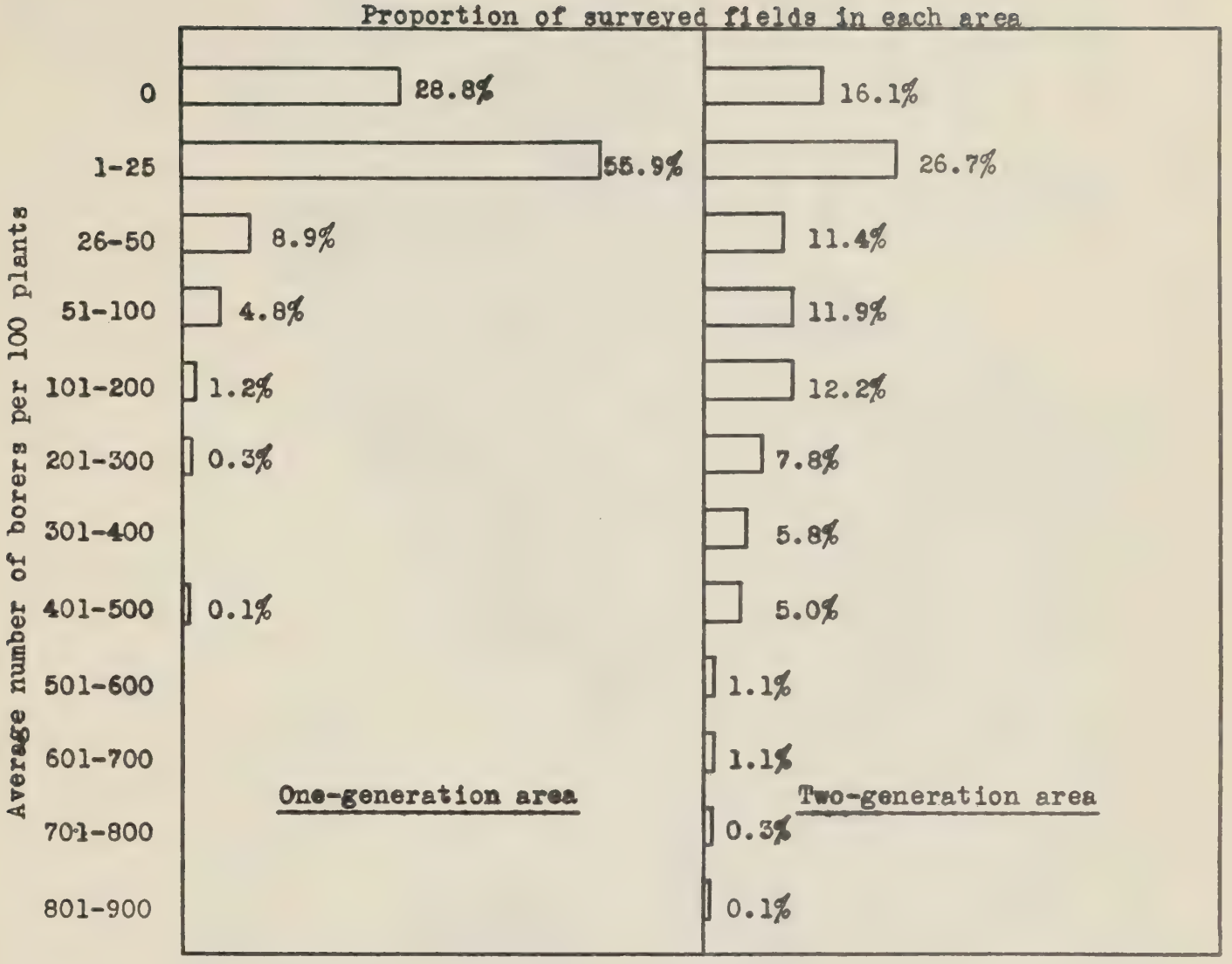
Borer Populations in the Eastern States Area
Based on Annual State Averages. 1925 - 1934.

State	Average number of borers per 100 plants								
	1925	1926	1927	1928	1929	1930	1932	1933	1934
Connecticut	-	-	-	3.0	8.7	7.9	26.1	103.8	210.1
Maine	-	-	-	2.6	2.6	5.6	20.0	-	-
Massachusetts	68.9	44.7	54.7	213.2	235.6	205.0	162.2	213.5	118.5
New Hampshire	3.0	0.5	01	2.5	11.7	4.6	19.9	-	7.6
New Jersey	-	-	-	-	-	-	0.3	-	7.7
New York (Long Island)	-	-	-	-	49.4	77.9	394.4	356.5	279.6
Rhode Island	-	13.5	32.8	202.5	187.4	52.3	93.3	235.2	117.0
Vermont	-	-	-	-	-	-	11.6	-	23.2
Area average*				84.8	82.6	58.9	91.0	227.2	109.1

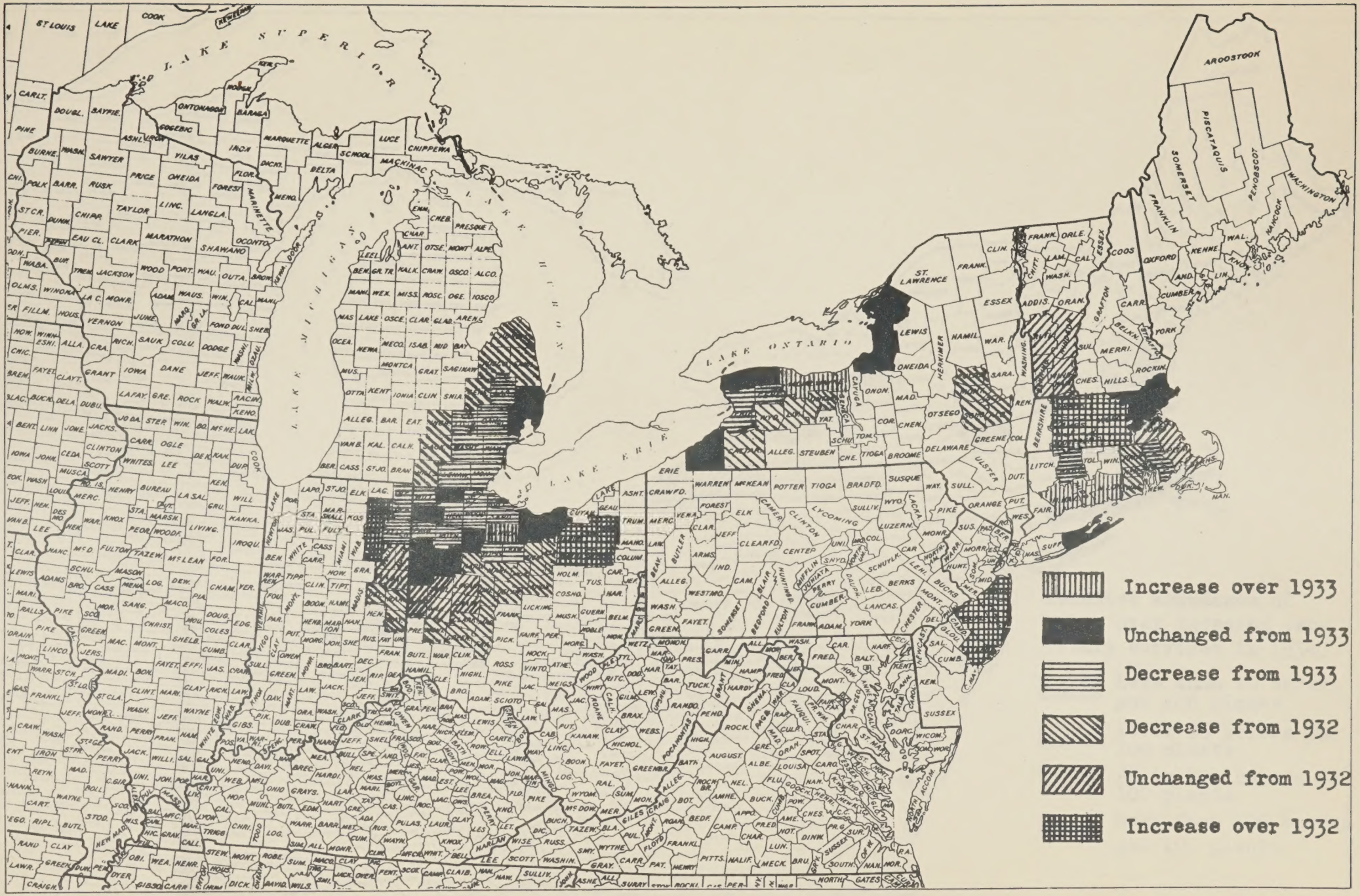
- No survey.

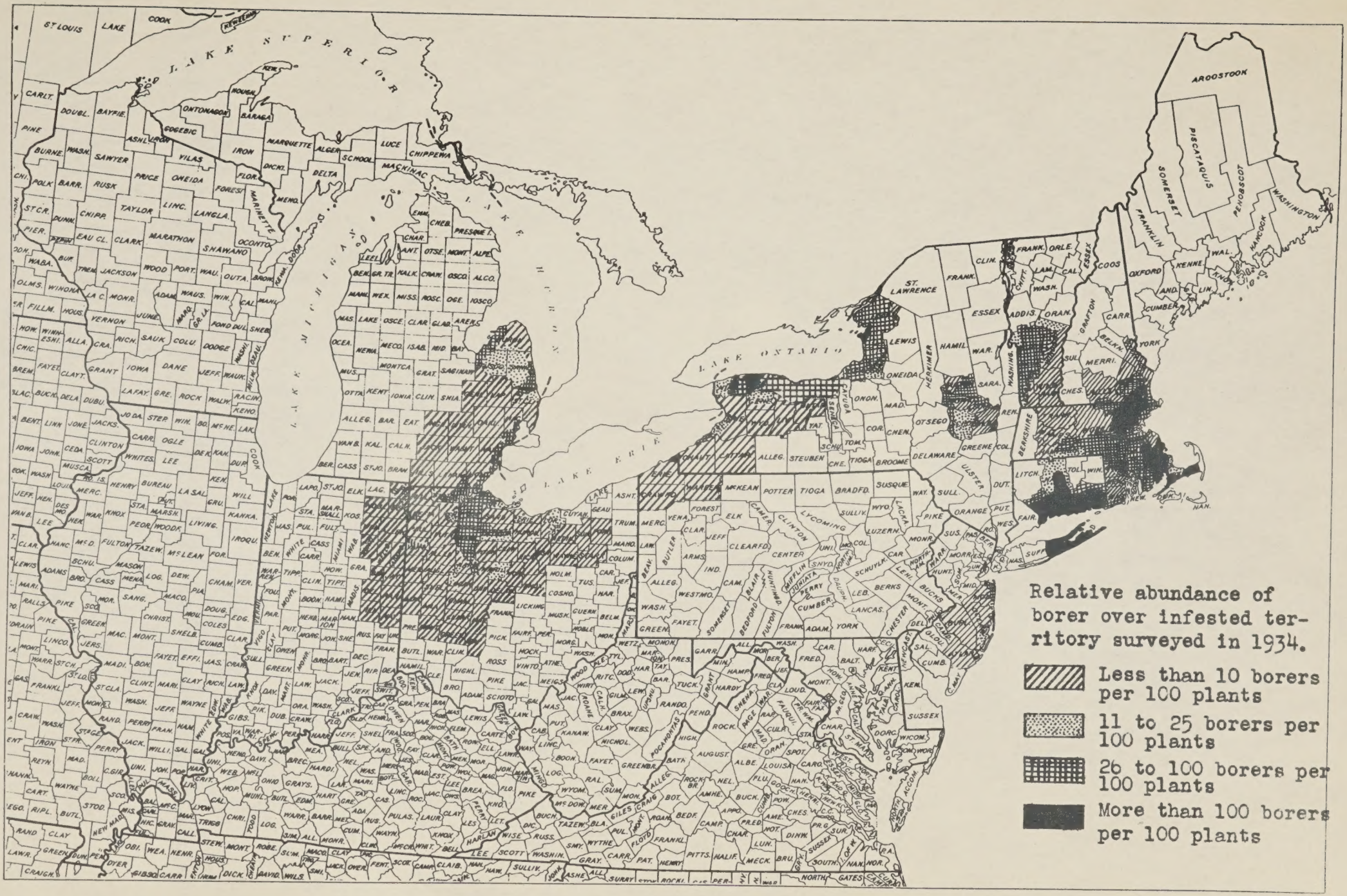
* Obtained from a division of the total of state averages by the number of states. No calculation of area averages for 1925, 1926, and 1927 because of too inadequate sampling to represent accurately the degree of infestation.

NOTE: Above averages are based on a varying number of counties surveyed each year and are indicative of the general trend of borer populations rather than representative of a true comparison. No survey was conducted in 1931.



Grouping of cornfields surveyed in 1934 according to their borer populations. The percentages for the one-generation area are based on a total of 1240 surveyed fields; those for the two-generation area are based on a total of 340 surveyed fields.


Increase over 1933
Unchanged from 1933
Decrease from 1933
Decrease from 1932
Unchanged from 1932
Increase over 1932


LAKE SUPERIOR
LAKE MICHIGAN
LAKE HURON
LAKE ONTARIO
LAKE ERIE
Relative abundance of borer over infested territory surveyed in 1934.
Less than 10 borers per 100 plants
11 to 25 borers per 100 plants
26 to 100 borers per 100 plants
More than 100 borers per 100 plants